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### **MUNICIPAL AND INDUSTRIAL WATER CONSERVATION: REDUCING FUTURE DEMANDS**

Water conservation will play an important role in satisfying future water needs in the Weber River Basin by reducing future water demands. If water providers implement water conservation programs and measures now, not only will they be better able to meet immediate needs but they will also be better prepared to satisfy long-term demands. Since the bulk of new water demands will be in the municipal and industrial (M&I) sector, the focus of this chapter is M&I water conservation. Water conservation, as it relates to agriculture, is discussed in Chapter 5.

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#### **UTAH'S M&I WATER CONSERVATION GOAL**

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The state has developed a specific goal to conserve water use directly linked to M&I needs. This goal is to reduce the 1995 per capita water demand from public community systems<sup>1</sup> by at least 25 percent before 2050. Specifically, statewide per capita demand will need to decline from 321 gallons per capita per day (gpcd) to a sustained 240 gpcd or less. This goal is based on modeling and research that indicates indoor and outdoor water use can be reduced by 25 percent or more. Indoor reductions will be realized through the installation of more efficient fixtures and appliances and public education. Outdoor reductions will be realized through public education, emphasizing more efficient application of water on landscapes, and reduction of turf areas.

Several communities within the Weber River Basin have set specific water conservation goals that will help the state reach its objective. Clearfield and North Salt Lake have set a goal to reduce per capita water demand in their cities 10 percent over five years.<sup>2</sup> Based on current costs and uses identified by each city, this

amounts to an annual savings of approximately \$13,000 in Clearfield and about \$34,000 in North Salt Lake. If achieved, this will also allow these cities to delay or reduce the costs associated with drilling and equipping new wells, and providing more storage capacity—projects that could easily cost millions of dollars. Other communities in the basin need to follow suit and set specific water conservation goals.

### **Establishment of Baseline Water Use**

One data need that is critical for a water provider to monitor the success of water conservation measures is the determination of an accurate baseline water use. This typically includes all M&I uses except for self-supplied industries, private domestic and other non-community systems. This baseline use is usually expressed as gallons per capita per day (gpcd).

The Division of Water Resources has determined a baseline value that it will use to monitor progress toward reaching the conservation goal. This baseline is for 1995 when the total per capita water use of all public water supplies in Utah, including secondary water, was estimated to be 321 gpcd. This statewide value was based upon data collected in each basin during the years 1992 to 1998. The data for the Weber River Basin corresponds to the use during the year 1992. According to this initial survey in the Weber River Basin, the total use of public water supplies in the basin was 330 gpcd, similar to the statewide value.

Although the basin value provides useful information for comparison purposes, individual communities should establish their own baseline use rates. This will assist them in setting appropriate goals and monitoring the progress toward reaching those goals through the various conservation measures and programs they decide to implement.

## **Monitoring Progress**

The Division of Water Resources has established a process to monitor the progress toward achievement of the state's water conservation goal. Currently, M&I water use is collected for several hydrologic river basins every year. This data is stored in a database and published in an M&I water use study for each basin. Every five years, the data from each of these studies is compiled and a new statewide summary of M&I water use is prepared.

A process to monitor changes in water use during the years between the five-year statewide summaries has also been established. Specifically, monthly data is collected from several water providers throughout the state and compared against equivalent use for prior years. Water use data in the Weber River Basin is collected from Weber Basin Water Conservancy District. Although this process will help provide a useful estimate of total water use for the state and the basin, the division will rely primarily on the five-year summaries to gage progress toward achieving the goal.

Thus far, the division has completed two statewide summaries representing the years 1995 and 2000 and three interim yearly estimates for 2001, 2002 and 2003. For the Weber River Basin, the division has two sets of data representing the years 1992 and 2001. The results of the statewide analyses and the two data sets for the Weber River Basin are discussed near the end of this chapter under the section titled, "Progress Made Thus Far."

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## **WATER CONSERVATION'S ROLE IN MEETING FUTURE NEEDS**

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Achieving the goal of at least a 25 percent reduction in per capita demand of publicly supplied water will have significant impacts on Utah's future water needs. If Utah successfully achieves its M&I water conservation goal, the total statewide demand will decrease by about 400,000 acre-feet per year by 2050, which represents the most significant component in meeting Utah's future water needs. Approximately 92,000 acre-feet per

year of this amount (the approximate capacity of Pineview and East Canyon reservoirs) will occur within the Weber River Basin. Without water conservation, it is estimated that by the year 2050 the Weber River Basin would experience an increase in water demand above the current demand of about 181,000 acre-feet per year. With conservation, this increase can be cut to approximately 89,000 acre-feet.

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#### **WHAT WATER PROVIDERS CAN DO TO ENSURE WATER CONSERVATION GOALS ARE MET**

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In July 2003, the Division of Water Resources published an M&I water conservation plan for the state of Utah.<sup>3</sup> This plan outlines the state's strategy to help ensure the water conservation goal is achieved and contains specific programs and other activities water providers could implement to ensure that their goals are met. This strategy incorporates various existing planning activities as well as some new programs implemented recently. The portions of this strategy with which local water providers can assist the state in achieving the water conservation goal are listed below.

##### **1 - Prepare Water Conservation Plans**

##### **2 - Support the Public Information Program of the Governor's Water Conservation Team**

##### **3 - Implement Best Management Practices**

##### **4 - Set Example at Publicly Owned Facilities**

The Water Conservation, Education and Use Section within the Division of Water Resources is responsible for administering these strategies. The section's Water Conservation and Education coordinators work with communities to develop a balanced strategy that will help water providers achieve their goals.

##### **1 - Prepare Water Conservation Plans**

In 1998 and 1999, the Utah Legislature passed and revised the Water Conservation Plan Act. This act required each water retailer with more than 500 connections and water conservancy districts to prepare a

water conservation plan and submit it to the Division of Water Resources by April of 1999. Water Conservation Plans are to be updated and resubmitted every five years from the date the original plan was created. Table 14 shows the status of conservation plans within the basin and the dates that updates are due.

In addition to the legislative requirements, state water funding boards have stipulated that a plan must be in place prior to the approval of any financial assistance. The Board of Water Resources has also stipulated that

TABLE 14  
Status of Water Conservation Plans

Community System	Submitted Plan	Update Due*	Community System	Submitted Plan	Update Due
Bona Vista Water Imp. Dist.	Yes	4/28/2004	Perry City	Yes	9/7/2004
Bountiful City	Yes	4/30/2004	Pleasant View	No	-
Centerville	Yes	6/3/2004	Riverdale City	Yes	3/17/2004
Clearfield	Yes	2/1/2005	Roy	Yes	8/21/2004
Clinton City	No	-	Roy Water Cons. Subdist.	Yes	12/17/2007
Coalville	Yes	4/30/2004	South Davis Co. Water Improvement District	Yes	3/29/2004
Community Water Co.	No	-	South Ogden City	Yes	3/12/2004
Farmington	No	-	South Weber City	Yes	3/20/2005
Fruit Heights	Yes	3/24/2004	Summit Water Distrib.	Yes	3/19/2004
Gorgoza Mutual Water Co.	Yes	6/11/2002	Sunset City	No	-
Hill Air Force Base	No	-	Syracuse	No	-
Hooper Water Imp. District	Yes	3/9/2004	Taylor-West Weber Water Imp. District	Yes	1/20/2008
Kamas City	No	-	Uintah Highlands Improvement District	Yes	5/27/2004
Kaysville	Yes	3/24/2004	Washington Terrace	No	-
Layton City	No	-	Weber Basin Water Conservancy District	Yes	3/24/2004
Morgan City	Yes	4/1/2004	Weber-Box Elder Conservation District	Yes	5/1/2004
Mountain Regional Special Service District	No	-	West Bountiful	Yes	4/1/2004
North Ogden	Yes	7/1/2004	West Point	Yes	9/7/2004
North Salt Lake	Yes	5/16/2005	Wolf Creek Water and Sewer Company	Yes	4/30/2004
Ogden City	No	-	Woods Cross	No	-
Park City	Yes	4/19/2006			

\* Updates are due every five years after the original plan is submitted.

petitioners for its funds must address the following water conservation measures before receiving funds:

- A time-of-day watering ordinance, prohibiting watering during the hottest daytime hours (10 am to 6 pm, for example).
- A progressive water rate structure.

As of September 2003, 66 percent (27 out of 41) of the water retailers and conservancy districts in the Weber River Basin who were supposed to submit plans have done so.<sup>4</sup> Some of the significant water suppliers that have not yet submitted plans and should do so as soon as possible include the following cities and towns: Clinton, Farmington, Layton, Ogden, Pleasant View, Sunset, Syracuse, Washington Terrace and Woods Cross.<sup>5</sup> These water suppliers alone provide water to approximately 48 percent of the basin's population.

The Water Conservation Plan Act and frequent drought conditions have given water conservation needed emphasis. Extensive media coverage is given to water conservation during drought. Local water providers need to capitalize on this increased awareness by making water conservation an integral part of their policy and operations. Each community can take advantage of this opportunity by preparing an effective water conservation plan.

## **2 - Support the Public Information Program of the Governor's Water Conservation Team**

All local water providers have the opportunity to provide valuable support for the public information program created by the Governor's Water Conservation Team. This program is designed to inform the public by providing water conservation information and education. The program's main component is to produce and manage a comprehensive water conservation media campaign. The Division of Water Resources supports this program by providing information through a water conservation web page, a water-wise plant tagging program and web page, and water conservation workshops.

### Governor's Water Conservation Team

During the summer of 2001, Governor Leavitt called an urgent meeting with Utah's water officials. After discussing the serious nature of the drought and the need for a long-term effort to conserve water, the Governor called for the creation of a committee to coordinate a statewide water conservation campaign. This committee was organized and eventually became the Governor's Water Conservation Team. The team is made up of key water officials from the state's five largest water conservancy and metropolitan water districts (including the Weber Basin Water Conservancy District), the Director of the Division of Water Resources, and others.

### The Team's Mission

The mission of the team is to develop a long-term statewide water conservation ethic that will result in a reduction in M&I water use of at least 25 percent. Building upon the successes and name recognition of Jordan Valley Water Conservancy District's "Slow the Flow" campaign, the team is working together to not only help Utahns get through the drought, but develop a water conservation ethic even in non-drought years. The team believes that through its efforts, state and local entities will be better able to communicate a consistent water conservation message to their constituents.

### Media Campaign

Thus far, the top priority of the Governor's Water Conservation Team has been the joint funding and production of a statewide media campaign, which includes radio and TV ads, printed materials, and various presentations.

The first group of radio and TV ads included Governor Leavitt as spokesperson and aired during the fall of 2001. Several additional ads were produced for 2002; these aired on several radio stations throughout Utah and featured weatherman Kevin Eubank. One of the 2002 ads won a 23<sup>rd</sup> Annual Telly Award, which honors

outstanding non-network or cable television commercials, video productions and films. All ads are available online at: **[www.conservewater.utah.gov](http://www.conservewater.utah.gov)**.

Building upon these successes, the Governor's Water Conservation Team added some more radio and TV spots to the 2003 campaign. In addition to Governor Leavitt's continued presence as a spokesperson, these ads also include Utah resident Merlin Olsen, a well-known actor and retired NFL football star.

The Governor's Water Conservation Team has also facilitated the production of various printed materials to support the media campaign. To date, several posters and brochures have been produced to help spread the water conservation message to Utah's citizens. Building upon Utah's heritage and the legacy of water resources management in the state, these printed materials reinforce and expand upon the conservation message of the radio and TV ads. Two of the brochures deal with water-wise landscaping and how to efficiently water a landscape and are available for distribution from the team or the Division of Water Resources or [www.conservewater.utah.gov](http://www.conservewater.utah.gov).

The Team welcomes financial contributions and other support from other entities that wish to contribute to the media campaign. Greater financial support will allow the Team to increase TV and Radio coverage, and will help keep water conservation in the public spotlight.

*Water Conservation Web Page – [www.conservewater.utah.gov](http://www.conservewater.utah.gov)*

Over the past few years the public interest in water conservation has grown tremendously. With it has come a demand to disseminate a consistent and effective water conservation message. Recognizing this need, the Division of Water Resources has created a water conservation web page to promote effective water conservation habits in Utah and support the Governor's Water Conservation Team. This web page has been online since the spring of 2002 and contains materials of interest to all ages, as well as valuable resources for



water agencies. Founded on the concept that water conservation is easy and can save everyone money, the web page is one of the best resources for individuals who are searching for ways to conserve water.

Since the web page's creation, the Governor's Water Conservation Team has recognized it as a valuable resource. As of 2003, all media campaign materials produced by the team advertise the web page as an additional resource to which Utahns can turn for more information. Additionally, all TV and radio spots from the media campaign are available on the web page. The division will continue to develop and refine content for this web page that will assist local water providers with their water conservation efforts.

*Water-Wise Plant Tagging Program and Web Page – [www.waterwiseplants.utah.gov](http://www.waterwiseplants.utah.gov)*

The Division of Water Resources, in cooperation with USU Extension, Bureau of Reclamation, and numerous other water providers and interested agencies, has helped develop a water-wise plant tagging program to promote the use of native and other well-adapted plants in Utah landscapes. Thus far, this program has distributed approximately 500,000 bright-yellow tags and promotional posters to participating nurseries and garden centers.

The division has also created a web page to support the effort. This web page is designed to help customers identify and select plants for their landscapes; it includes over 300 plant species with pictures and descriptions of water needs, hardiness and other characteristics. The web site is hosted on the state's Internet domain.

*Water Conservation Workshops*

During the winter of 2000 and 2001, the Division of Water Resources conducted 16 workshops in communities around the state to introduce water conservation planning concepts. These workshops were well-attended and highlighted ways water suppliers could use water rates as a means to provide conservation incentives to their customers. Since conducting these workshops, several communities around the state have adopted a more progressive water rate structure. These workshops have been a major success and will

continue to be conducted along with private consultations to help interested entities with their water conservation efforts.

In addition to these educational workshops, the division and other state and local agencies have co-sponsored several Large Water User Workshops along the Wasatch Front. Aimed at large commercial and institutional landscapes, these one-day workshops give landscape managers and their crews the opportunity to learn about irrigation system efficiency, plant health and alternatives to turf. Each participant in the workshop receives a complete USU Extension workbook, a full set of water audit catch cups, and a soil probe. These workshops were extremely popular in the summer of 2002, and continue to be well attended.

### **3 - Implement Best Management Practices**

The Division of Water Resources recommends that the basin's water providers consider using the following list of Best Management Practices (BMPs) in their water conservation programs. Water providers should implement a mixture of these practices that is tailored to fit their own unique needs. Broad implementation of these BMPs will help the state achieve its water conservation goal:

#### ***BMP 1 - Comprehensive Water Conservation Plans***

- Develop a water management and conservation plan as required by law. Plans are to be adopted by the water agency authority (city council, board of directors, etc.) and updated no less than every five years.

(For more information, see "Prepare Water Conservation Plans" on page 36.)

#### ***BMP 2 - Universal Metering***

- Install meters on all residential, commercial, institutional and industrial water connections. Meters should be read on a regular basis.
- Establish a maintenance and replacement program for existing meters.
- Meter secondary water at the most specific level possible, somewhere below source water metering. Individual secondary connection metering should be done as soon as technology permits.

In order to effectively bill customers according to the amount of water they use, their connection must be metered, and these meters must be read frequently. Metering potable (drinking) water connections is a high priority for most community water systems within the Weber River Basin. As indicated in the water conservation plans submitted to the Division of Water Resources, not only do these systems meter their connections but most of them actively read and replace meters to assure they are functioning properly.

While potable water lines are metered, individual secondary water connections are rarely monitored. Because secondary water generally undergoes minimal, if any, treatment, and the water lines are typically drained each fall, meters on these lines easily clog and malfunction. These problems are not easy to overcome and may require expensive retrofits that are not currently feasible. Eventually, however, a better accounting of secondary water use by the end user will be required. This may make it necessary for secondary water providers to apply some degree of treatment to the water or use a new kind of meter that will operate satisfactorily with untreated water.

### ***BMP 3 - Incentive Water Conservation Pricing***

- Implement a water pricing policy that promotes water conservation.
- Charge for secondary water based on individual use levels as soon as technology permits.

Table 15 lists average water prices for potable water of several cities in the Weber River Basin. As shown, rates in the basin are slightly lower than the Utah average and are well below the national average. Some reasons that may help explain why rates are lower in the Weber River Basin include the following:

- Much of the basin's population is located near mountain watersheds which have been easily developed to gravity feed a significant portion of the water needs;
- Ground water use has been managed well with pump-lifts that are reasonable and in many areas have remained fairly steady;
- Property taxes are used to pay a portion of the water costs;
- Many communities have secondary water systems which provide less-expensive, untreated water for outdoor irrigation; and
- The Weber Basin Project provides inexpensive water to a large portion of the population.

Whatever the reasons for the basin's lower rates, simply raising water rates is not the solution. Instead, water pricing strategies that provide an incentive to customers to eliminate waste and use less water should be implemented. Rate structures must also be designed to avoid capital shortfalls as customers succeed in conserving water and provide sufficient income to finance system maintenance and improvements. Some of these effective rate structures are discussed briefly below. See Figure 9, on page 56, for a visual representation and example bill summaries for each structure.

#### Increasing Block Rates

Most pricing structures typically have a base fee, which must be paid whether or not any water is used. A fixed amount of water is usually made available at no additional cost. The price of subsequent increments of water supplied then increases in a step-wise fashion. This rate structure encourages efficiency only if the steps in the incremental price are sufficient to discourage excessive use. Separating the base fee from any water actually delivered allows the water supplier to better reflect the actual costs of providing water service. Ideally, the base fee would be set to cover the fixed costs of providing service while the overage rates would be set to cover the variable costs of delivery.

The increasing block rate is currently used by about 42 percent of Utah's drinking water systems. In the Weber River Basin, 56 percent of drinking water systems employ this type of rate structure.<sup>6</sup> Base charges in these systems range from a low of \$4.55 in South Ogden to a high of \$64 in some areas of Summit County,

TABLE 15  
**Potable Water Prices of Various Weber River Basin Communities\***

City	Estimated Cost per 1,000 gallons	Average Monthly Bill
Park City	\$2.24	\$54.45
North Ogden	\$2.22	\$16.91
Eden	\$1.96	\$25.92
Roy	\$1.43	\$13.81
Morgan	\$1.20	\$25.25
Layton	\$1.16	\$23.74
Kaysville	\$1.11	\$12.53
Bountiful	\$1.05	\$13.90
Sunset	\$0.81	\$17.11
Riverdale	\$0.73	\$24.00
<b>WEBER BASIN AVG.†</b>	<b>\$1.15</b>	<b>\$22.34</b>
Utah Average	\$1.17	\$28.77
National Average	\$2.20	\$32.48

\* Does not include the cost of nonpotable water (which is generally much cheaper) that may be delivered within the communities listed.

† Average based on only those communities that submitted data, including some not listed above.

(Sources: Utah Division of Drinking Water, 2001 Survey of Community Drinking Water Systems, 2002. Raftelis Financial Consulting, PA, 2002 Water and Wastewater Rate Survey, Charlotte, N.C., 2002, 6.)

and average about \$17.48. The amount of water made available at no additional cost ranges from a low of 0 gallons in many communities to 20,000 gallons in some areas of Summit County, with an average of about 9,000 gallons. The price of the first additional increment of water (not supplied as part of the base charge) ranges from a low of \$0.25 per 1,000 gallons in Ogden to \$2.50 per 1,000 gallons in Riverdale, with an average of about \$1.22 per 1,000 gallons. The price of additional increments ranges from a low of \$0.75 in Clearfield to \$15 for the Gorgoza Mutual Water Co.<sup>7</sup>

### Seasonal Rates

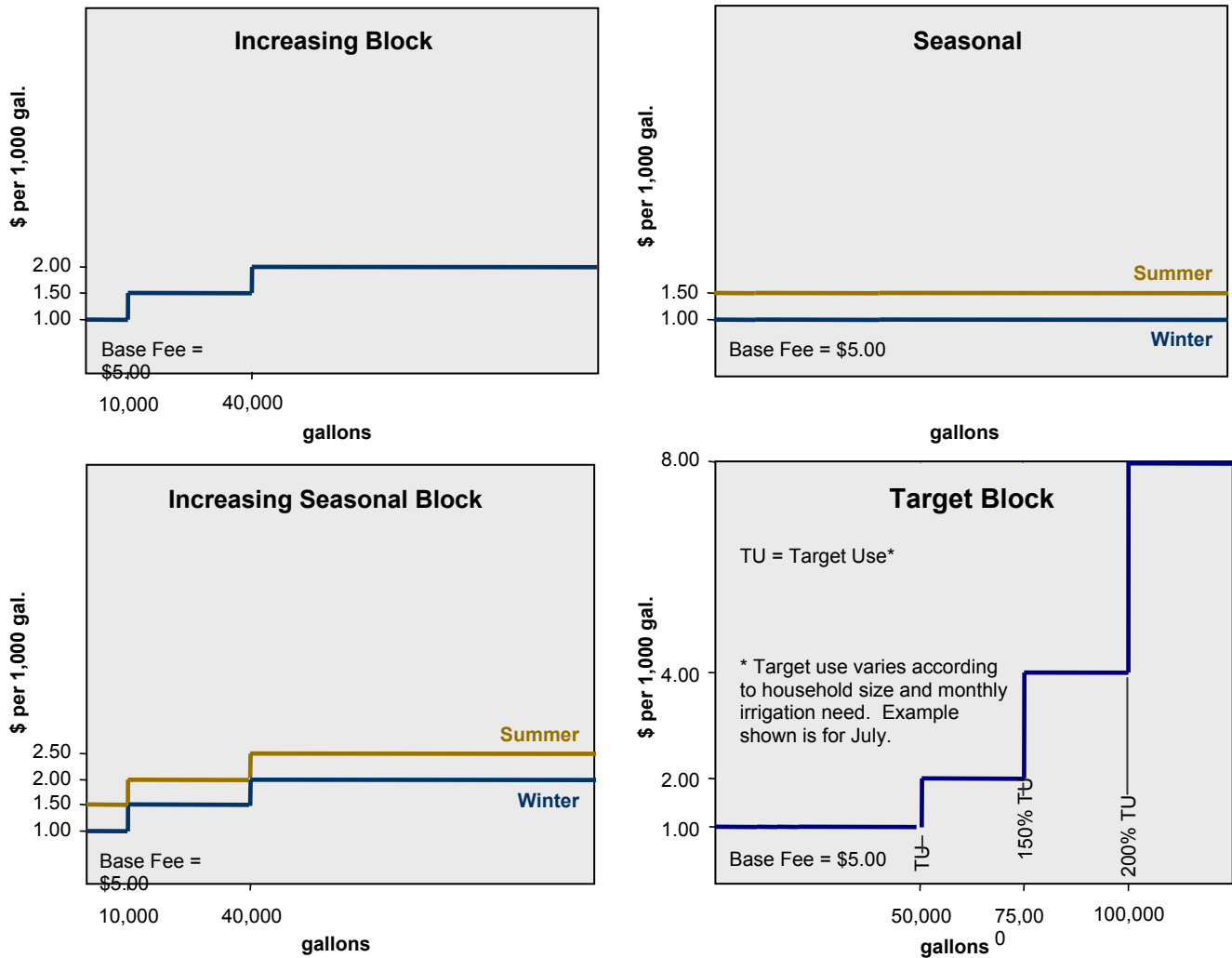
This rate structure has a base charge much the same as the increasing block rate. The main difference is that instead of rate increases depending on the volume of water used, rates are set according to seasons. The price for each unit of water delivered in winter is lower than for water delivered in the summer. The summer price is set strategically to encourage consumers to be more conscious of irrigation habits during the months when peak demands often strain the delivery system. If desired, a spring and fall use rate can also be applied. This helps reflect the rising and falling costs associated with typical use patterns of a water supply system. It also provides water suppliers with an opportunity to remind consumers that irrigation needs are typically less during the spring and fall months and, therefore, sprinkler timers should be adjusted accordingly. There are no water systems in the Weber River Basin that currently use a seasonal block rate structure.

### Increasing Seasonal Block Rates

This rate structure is a combination of the increasing block and seasonal rates. Like the seasonal rate, it has a price for each unit of water delivered in winter that is lower than for water delivered in the summer.

However, instead of a flat rate for a given season, the increasing seasonal block rate has an increasing block rate for each season (see Figure 9). If desired, an increasing rate for the spring and fall seasons can also be applied. This type of rate structure is new to Utah. In 2003, Salt Lake City and Sandy adopted this type of rate structure. Kaysville is the only community in the Weber River Basin that currently uses an increasing seasonal block rate structure. Kaysville charges a base rate of \$12.50 for the first 10,000 gallons. During the

FIGURE 9  
Example Rate Structures and Bill Comparison



Billing Month & Use Scenario	Increasing Block	Seasonal	Increasing Seasonal Block	Target Block~
<b>January</b>				
Low Use (7,500 gal.)	\$12.50	\$12.50	\$12.50	\$12.50
Average Use (10,000 gal.) <sup>~</sup>	\$15.00	\$15.00	\$15.00	\$15.00
High Use (15,000 gal.)	\$22.50	\$20.00	\$22.50	\$25.00
<b>July</b>				
Low Use (37,500 gal.)	\$50.50	\$60.50	\$75.00	\$42.00
Average Use (60,000 gal.) <sup>*</sup>	\$85.00	\$95.00	\$130.00	\$75.00
High Use (90,000 gal.)	\$145.00	\$140.00	\$205.00	\$165.00

\* For January, the average use is based on a household of four which uses approximately 80 gallons per person per day. For July, the average use is based on an irrigation requirement of 7.6 inches and a lot size of about 0.29 acres.

winter season, the city charges \$1.25 per thousand gallons for all use in excess of the initial 10,000 gallons. During the summer, the city charges \$1.85 per thousand gallons for all use between 10,000 and 20,000 gallons, with a rate that increases to \$3.70 for each thousand gallon used in excess of 20,000 gallons.

### Target Block Rates

This rate structure requires that a target use be established for each customer. This target is based on the water needs of the landscape and the number of people in the home or business. Landscape water need is determined by using evapotranspiration rates for turf grass from local weather stations and landscape size. Then, each unit of water is priced in such a way so as to reward the consumer for using less than the target use and penalize them for using amounts that exceed the target use (see Figure 9). Water providers can assess penalties by using a sequentially higher rate, which typically doubles with each volume increment in excess of the target. Because of the effort required to obtain and maintain accurate data on all customers, the target block rate requires more staff and capital resources than any of the other rate structures. Currently, there are no water systems in the Weber River Basin that use a target block rate structure.<sup>8</sup>

### Keys to Successful Incentive Pricing

Implementing incentive pricing structures, such as those outlined above, must be done carefully to be successful. A successful rate structure has the following characteristics:

- encourages more efficient water use without causing a reduction in system revenue;
- provides for the identification of waste, rewards efficient use and penalizes excessive use;
- produces revenues from penalty rates that are used to fund water conservation programs;
- is supported by a water bill that clearly communicates the cost of wasted water to the responsible person;
- is supported by a person or staff who can respond to customer calls for help in reducing use; and
- is accepted by the community.

### ***BMP 4 - Water Conservation Ordinances***

- Adopt an incentive water rate structure.
- Adopt a time-of-day watering ordinance.
- Adopt an ordinance requiring water-efficient landscaping in all new commercial development. This should include irrigation system efficiency standards and an acceptable plant materials lists.

- Adopt an ordinance prohibiting the general waste of water.

(For sample ordinances, go to **[www.conservewater.utah.gov](http://www.conservewater.utah.gov)** and click on “Agency Resources.”)

### Outdoor Watering Guidelines and Ordinances

If residential outdoor conservation were practiced, the potential water savings would be great since it makes up the biggest part of residential use (approx. 72 percent) in the Weber River Basin. The Division of Water Resources estimates the water needed to produce a healthy lawn on a typical residential landscape could be reduced at least 25 percent in the Weber River Basin by following two simple steps. These are: (1) Watering to meet the turf water requirement—the amount of water needed by a turf to produce full growth; and (2) Maintaining a sprinkler distribution uniformity (how evenly the sprinkler system spreads the water) of at least 60 percent.<sup>9</sup> Table 16 contains a recommended irrigation schedule for each of the counties within the Weber River Basin. Not only will watering to meet this turf water requirement conserve water, but it also produces a healthier and better-adapted turf. Average residential sprinkler uniformities in Utah have been found to be about 58 percent.<sup>10</sup> Increasing these to at least 60 percent can be easily achieved by designing sprinkler systems properly and by inspecting and maintaining their performance regularly.

If a homeowner were to implement additional outdoor watering guidelines, overall residential water consumption could be reduced beyond 25 percent.<sup>11</sup> Other conservation measures include setting watering durations to suit different soil types and micro-climates, using several short durations (cycling) to water deeply while avoiding runoff, and watering flower and shrub areas less than turf areas. Another method that has proven effective in reducing water consumption is simply confining watering to times during the day that minimize evaporation, between 6 p.m. and 10 a.m., for example. These recommendations should be made to the public during both wet and dry climatic conditions.

The Bountiful Water Sub-Conservancy District was one of the first water suppliers along the Wasatch Front to implement a time-of-day watering restriction. After recommending a voluntary restriction in watering



TABLE 16  
Recommended Irrigation Schedule\*

Irrigation Period	Watering Interval <sup>†</sup> (days between watering sessions)			
	Davis County	Weber County	Morgan County	Summit County
Startup until April 30	6	6	7	7
May	4	4	5	5
June	3	3	3	4
July	3	3	3	4
August	3	3	4	4
September	5	6	5	6
October 1 until shutdown	9	10	9	-

\* This schedule assumes an application of ½ inch of water per watering session and is based on historical turf water requirements from Hill, Robert, Consumptive Use of Irrigated Crops in Utah, (Logan: Utah Agricultural Experiment Station, 1994).

<sup>†</sup> Based on annual average turf water requirements of approximately 24" (Davis), 25" (Weber), 20" (Morgan), 18.5" (Summit).

during the daytime hours in the mid-1980s, the district immediately realized a decrease in water consumption of about 17 percent.<sup>12</sup> In 1999, the Sub-Conservancy District adopted this restriction as a formal ordinance. Since that time, the Weber Basin Water Conservancy District and numerous communities

across the state have adopted similar ordinances.

The potential savings resulting from irrigation guidelines and ordinances make such measures extremely attractive. The immediate reduction in peaking loads that is produced not only conserves water but delays the need for system upgrades and expansion that are dictated by peak system demands. Any water conservation program should seriously consider such measures.

### Landscape Guidelines and Ordinances

The types of plants that make up a landscape and the total area that requires landscaping can have a significant impact on overall water consumption. Replacing typical turf grass and other water-loving vegetation with native or adapted low water-use plants significantly reduces outdoor water needs; hardscaping a portion of the landscape eliminates the need to water that area. If the low water-use vegetation is irrigated using efficient irrigation practices, outdoor water use can be reduced above and beyond the 25 percent mentioned previously. Not only do water-wise landscapes conserve water, but they consume less amounts of chemicals, require less maintenance than typical turf, and add interest and color to the ordinary landscape.

Changing the way people landscape so that it more closely matches the stresses of Utah's semiarid climate is an important aspect of long-term water conservation. Demonstration gardens and public education programs that communicate efficient landscaping techniques, as well as ordinances that promote more "natural" landscaping practices, are important components of an outdoor water conservation program. Ordinances that require unnecessary green spaces and promote water waste should be eliminated.

The Utah Botanical Garden, currently moving to a new location near I-15 in Kaysville, will demonstrate water conservation principles in its landscapes. The Utah House, a model home that demonstrates energy and water conservation principles, is now open to the public at the garden. When completed, the garden will provide residents of the Weber River Basin with a useful resource for landscaping ideas that are both attractive and water conscious.

Weber Basin Water Conservancy District has also contracted with Utah State University to include a demonstration garden at their headquarters in Layton. This garden should be completed and open to the public in 2004 and will be an extension of the Utah Botanical Garden in Kaysville. Red Butte Garden and Jordan Valley Water Conservancy District's Xeriscape demonstration garden in the Salt Lake Valley are also valuable resources for basin residents interested in water-wise landscaping.

#### ***BMP 5 - Water Conservation Coordinator***

- Designate a water conservation coordinator to facilitate water conservation programs. This could be a new person or an existing staff member.

#### ***BMP 6 - Public Information Programs***

- Implement a public information program consistent with the recommendations of the Governor's Water Conservation Team. Such programs can be adapted to meet the specific needs of the local area and may use the "Slow the Flow" logo with approval of the division. (For more information, see "Support the Public Information Program of the Governor's Water Conservation Team" on page 46.)

***BMP 7 - System Water Audits, Leak Detection and Repair***

- Set specific goals to reduce unaccounted for water to an acceptable level.
- Set standards for annual water system accounting that will quantify system losses and trigger repair and replacement programs, using methods consistent with American Water Works Association's Water Audit and Leak Detection Guidebook.

In some water systems, the best way to conserve water may be to discover and repair leaks within the distribution system. Leak detection and repair programs often receive substantial capital investment because the results of such efforts are quantified. However, if a thorough investigation determines that leaks are not a significant problem, such programs may not yield savings as significant as other conservation measures.

Nearly all of the water providers within the Weber River Basin who submitted water conservation plans to the Division of Water Resources indicated the importance of leak detection and repair programs to their operations. Some indicated that leaks had been measured to be less than 10 percent. Water utilities should carefully weigh the costs of infrastructure repair and replacement against all possible conservation measures in order to determine which will most economically attain the desired objectives.

***BMP 8 - Large Landscape Conservation Programs and Incentives***

- Promote a specialized large landscape water conservation program for all schools, parks and businesses.
- Encourage all large landscape facility managers and workers to attend specialized training in water conservation.
- Provide outdoor water audits to customers with large amenity landscapes.

***BMP 9 - Water Survey Programs for Residential Customers***

- Implement residential indoor and outdoor water audits to educate residents on how to save water.

A water audit is becoming a commonly used tool to help consumers reduce their water use. A complete water audit consists of an indoor and outdoor component. Indoors, a typical audit involves checking the flow rates of appliances and identifying leaks, and if necessary, replacing basic fixtures with low-flow devices and

making other necessary adjustments or repairs. Outdoors, an audit measures the uniformity and precipitation rate of an irrigation system, identifies problems, and suggests how to improve system efficiency and water according to actual plant requirements.

Beginning in 1999, the Jordan Valley Water Conservancy District, in cooperation with the Central Utah Water Conservancy District and Utah State University Extension Service initiated a free "water check" program in Salt Lake County. A water check is basically a simplified outdoor water audit for residents. The slogan for the program is "Slow-the-Flow, Save H<sub>2</sub>O." As of the summer of 2002, the program was operational throughout Davis, Salt Lake, Utah, Duchesne and Uintah counties, as well as portions of Weber County.

### ***BMP 10 - Plumbing Standards***

- Review existing plumbing codes and revise them as necessary to ensure water-conserving measures in all new construction.
- Identify homes, office building and other structures built prior to 1992 and develop a strategy to distribute or install high-efficiency plumbing fixtures such as ultra low-flow toilets, showerheads, faucet aerators, hot water recirculators, etc.

#### *Retrofit, Rebate and Incentive Programs*

It has long been known that the largest indoor consumption of water occurs via the toilet. This fact prompted legislation to phase out the manufacture of toilets, which typically consumed 3.5 to 7.5 gallons per flush, and replace them with newer low-flow devices that consume 1.6 gallons or less. Since 1992, Utah law requires the installation of these toilets in new construction, and since 1994, federal law prohibits the manufacture of higher-flow toilets. This change reduces indoor residential water consumption in new construction by an estimated six gpcd,<sup>13</sup> but does not affect homes constructed prior to 1992 unless old toilets are replaced. Replacing old-style toilets with newer water efficient designs is recognized by many utilities across the country as an effective way to produce water savings. This is accomplished through retrofit programs or rebates which provide an incentive for residents to remove their old appliances. Because it is fairly easy to

estimate the water savings that retrofit, rebate and incentive programs are likely to produce, these programs are a popular method used to help reach water conservation goals.

Although there are no communities within the Weber River Basin that currently sponsor a program to replace toilets or other appliances, Clearfield identified replacing toilets as an option that would be an effective way to reach its water conservation goal. According to its water conservation plan, if a homeowner were to replace all old-style toilets with newer models (average cost per unit of \$75), they would save approximately \$20 a year on their water bill and the city's water use would decline about 5 percent.<sup>14</sup>

### ***BMP 11 - School Education Programs***

- Support state and local water education programs for the elementary school system.

(For more information, go to [www.watereducation.utah.gov](http://www.watereducation.utah.gov).)

### ***BMP 12 - Conservation Programs for Commercial, Industrial and Institutional Customers***

- Change business license requirements to require water reuse and recycling in new commercial and industrial facilities where feasible.
- Provide comprehensive site water audits to those customers known to be large water users.
- Identify obstacles and benefits of installing separate meters for landscapes.

### ***BMP 13 - Reclaimed Water Use***

- Use reclaimed or recycled water where feasible.

(For more information, see “Water Reuse” in chapter 6.)

## **4 - Set Example at Publicly Owned Facilities**

It is important that government entities within the basin be a good example of water conservation for the citizens they serve. To help accomplish this at state owned facilities, the state recently revised its building guidelines and policies to incorporate water-wise landscapes and more water-efficient appliances at new facilities. In addition, the Governor has mandated that all state facilities avoid watering between 10 a.m. and

6 p.m. Local governments should consider making similar adjustments to their building guidelines. This will help ensure that water use at public facilities does not deter citizens from conserving water on their own landscapes.

The Division of Water Resources has a vast collection of materials that can help local governments strengthen their water conservation ethic. Various guidelines and recommendations, including sample ordinances, Xeriscape manuals and other resources are all available through the division. Many of these materials are also available online at the state's water conservation web page: [www.conservewater.utah.gov](http://www.conservewater.utah.gov).

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#### **PROGRESS MADE THUS FAR**

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##### **Statewide Summary**

According to the process described previously, the Division of Water Resources recently completed a second statewide summary of M&I water use. This summary includes data that represents an approximate statewide value for the year 2000. According to the data, the 2000 statewide per capita use of publicly supplied water has declined from the 1995 level of 321 gpcd to 293 gpcd, or nearly 9 percent. The 2000 number does not include the new data for the Weber River Basin (discussed below).

The division has also completed two interim estimates of water use since 2000. The 2001 estimate recorded a decline in water use of about 3 percent from the use estimated for 2000. In 2002 a decline in water use of an additional 9 percent was measured, for a net decrease in M&I water demand of about 12 percent since 2000.

##### **Weber River Basin**

In 2001 the Division of Water Resources collected new M&I data for the Weber River Basin. According to this survey, the use of public water supplies rose from the 1992 level of 330 gpcd to approximately 341 gpcd in 2001, an increase of just over 3 percent. Although it is uncertain why per capita use increased over this

time period, the Division of Water Resources believes that its most recent survey was more accurate than the previous survey and that the rapid growth in secondary water systems are two plausible explanations. Despite this small increase in per capita water use, separate water use data collected since 2000 suggests that substantial water conservation has been realized during the last several years.

As part of the statewide effort to estimate progress towards the state water conservation goal described above, the division has collected water use data from the Weber Basin Water Conservancy District (the basin's largest water supplier) every year since 2000. According to this data, water use within the district in 2001 declined by 14 percent below 2000 levels. In 2002, an additional 8 percent decrease in water use was realized. In 2003, water use increased 4 percent resulting in a total decrease over the three year period of 18 percent. Other water suppliers within the basin have reported even greater successes with water conservation. Summit Water Distribution Company, for instance, experienced a 30 percent reduction in water use between 2002 and 2003. The company believes that this astounding result is primarily due to the media campaign and other educational efforts of the Governor's Water Conservation Team.

While it is clear the water conservation message is being heard, and Weber River Basin residents are modifying their habits to become more efficient in their water use, it remains to be seen how much of this reduction is due to the severity of the current drought and how much is the result of permanently changed habits. The division will continue to monitor the situation closely, and will only know the answer to these important questions after several more years of data collection and analysis.

#### NOTES

<sup>1</sup> A private or publicly owned community water system which provides service to at least 15 connection or 25 individuals year round.

<sup>2</sup> Gilson Engineering, *Water Conservation Plan—Clearfield City*, (Draper: 2000), 8. North Salt Lake, *Water Conservation Plan*, (North Salt Lake: 2000), 8.

<sup>3</sup> Utah Division of Water Resources, *Utah's M&I Water Conservation Plan*, (Salt Lake City: Department of Natural Resources, 2003). This plan is available through the division's web page at: [www.conservewater.utah.gov](http://www.conservewater.utah.gov).

<sup>4</sup> Compliance ranged from a low of 50 percent in the West Desert and Utah Lake basins to a high of 100 percent in the Kanab Creek/Virgin River Basin (Kanab and St. George areas). The rate of compliance in the Jordan River Basin (Salt Lake Valley), where future water demands will be the greatest, was 89 percent.

<sup>5</sup> For an updated list of systems that have submitted plans to the Division of Water Resources, visit the following web page: <http://www.conservewater.utah.gov/agency/plans/WMCP.html>. All plans are available to the public at the division's office in Salt Lake City.

<sup>6</sup> Utah Division of Drinking Water, *2001 Survey of Community Drinking Water Systems*, (Salt Lake City: Dept. of Environmental Quality, 2002). A total of 40 systems within the Weber River Basin responded with information about their water rate structures. 21 of these employed a uniform rate structure; 18 employed an increasing block rate structure; and one system (Morgan City) used a decreasing rate structure. Conclusions cited in the text are based upon the data provided by these systems only and may not be representative of all systems within the basin.

<sup>7</sup> Ibid.

<sup>8</sup> As of January 2003, West Jordan City is the only community in Utah to have experimented with this type of rate structure, which they have not yet fully implemented. Once fully implemented, the city believes it will observe a swift reduction in water use of at least 15 percent.

<sup>9</sup> Utah Division of Water Resources, *Identifying Residential Water Use: Survey Results and Analysis of Residential Water Use for Thirteen Communities in Utah*, (Salt Lake City: Dept. of Natural Resources, 2000), 27. Weber River Basin communities that were included in the study are Clearfield, Kaysville and Roy. A copy of this document can be obtained online at the division's web site: [www.water.utah.gov](http://www.water.utah.gov).

<sup>10</sup> Earl Jackson, *Results and Impacts Report: Water Check 2001, Salt Lake County*, (Salt Lake City: USU Extension, 2002), Table 6.

<sup>11</sup> A possible reduction in outdoor water use of 50 percent is cited in numerous documents, among which the following is an excellent source of Utah specific information: Keane, Terry, *Water-wise Landscaping: guide for water management planning*, (Logan: Utah State University Extension Services, 1995), 1. This document is available on the Internet at the USU Extension Service's web page: [www.ext.usu.edu/publica/natrpubs.htm](http://www.ext.usu.edu/publica/natrpubs.htm).

<sup>12</sup> Utah Division of Water Resources, *An Analysis of Secondary Water Use in Bountiful, Utah*. This is a non-published report.

<sup>13</sup> Utah Division of Water Resources, 2000, 9.

<sup>14</sup> Gilson Engineering, 2000, 9.